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ABSTRACT

Twenty second grade students were tested to determine the possible relationships between concrete operations and reading and between cognitive clarity and reading achievement. The subjects performed six Piagetian conservation tasks and four tasks on cognitive clarity. Reading achievement was based on student records. The data on the relationship between concrete operations and the child's concept of reading were inconclusive, influenced by the instruments used to measure cognitive clarity, which apparently emphasized different aspects of cognitive clarity. There were significant relationships between the attainment of the concrete operations and (1) the ability to form classes of numbers, letters, and nonletter nonnumber characters; (2) the ability to form classes of nonsense words, words, phrases, and sentences; and (3) the cognitive clarity score derived from a free sorting task in which linguistic class concepts were emphasized. There were significant relationships among the three cognitive clarity measures and the reading scales, but not for all the variables. Thus, questions remained concerning the nature of the relationship between cognitive clarity of reading and reading achievement. (RL)

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THE CHILD'S CONCEPT OF READING: ITS RELATIONSHIP WITH COGNITIVE DEVELOPMENT AND READING ACHIEVEMENT

Master of Science in Education

by

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Statement of the Problem

The primary purpose of this research was to investigate the possible relationship between a child's cognitive level of development and the child's concept of reading. The secondary purpose was to explore the relationship between the child's concept of reading and his performance on a standardized reading measure.

The review of the literature focused on five related areas: the development of thought and language; the application of Piagetian cognitive theory to reading; theoretical definitions of reading; the child's view of the reading process; and the relationship between children's written language concepts and their reading ability.

Five conclusions were drawn from a literature search:

1. Language development in the early states is dependent on previously formed cognitive structures but plays a vital role in the later expression, socialization and extension of thought (Piaget, 1972; Sinclair-deZwart, 1969; Furth, 1966; Flavell, 1963; and Rees 1974).

2. Conservation ability may be an accurate indicator of reading readiness and the attainment of the concrete operations may be related to the understanding of linguistic concepts as well as reading achievement (Almy, 1967; Briggs and Elkind, 1973; Brekke and Williams, 1975; Stanfill, 1975; Elkind, 1975 & 1976; and Cox, 1976).

3. Children's concepts about reading and their use and understanding of linguistic terms have been investigated by Reid (1966),

Downing (1970a), Weintraub and Denny (1965), Lee (1969), and Tovey (1976) among others. This research indicates that the child's view of reading differs substantially from the adult view expressed in the psycholingustic model of reading by Goodman (1972 & 1975), Smith (1971), Stauffer (1969 & 1971) and others.

4. A sequence of development in the attainment of reading and linguistic concepts has been suggested in research studies conducted by Reid (1966), Clay (1968), Downing and Oliver (1973 & 1974), Francis (1973), Fryer (1976), Karpova (1966), Huttenlocher (1964), Holden and MacGinitie (1969), Meltzer and Herse (1969), and Papandropoulou and Sinclair (1974). In reading, this understanding, or cognitive clarity, appears to proceed logically from the child's experience with language and reading instruction.

5. Several studies have indicated that there is a relationship between cognitive clarity of reading and both reading readiness and later reading achievement (Durkin, 1961 & 1967; Downing, Ollila and Oliver, 1975; Holden and MacGinitie, 1969; McNinch, 1974; Ehri, 1975; Blanton and Mason, 1971; Johns, 1974; and Fryer, 1976).

Clearly there existed both the interest and need for further related investigation. Answers to the following questions were sought:

1. Do children at the concrete operational level demonstrate cognitive clarity of reading and of linguistic terms through their non-verbal and verbal responses?

2. Do children at the preoperational and transitional cognitive levels demonstrate a greater degree of cognitive confusion

about reading and about linguistic terms through their non-verbal and verbal responses?

3. Do children whose non-verbal and verbal behavior indicates congitive clarity of reading perform better on standardized reading measures than children whose behavior demonstrates confusion in reading concepts?

Method

Subjects

Twenty second graders, eight girls and twelve boys, from a heterogeneously grouped self-contained class in a middle income suburban school in western New York participated. The children's ages ranged from 7.3 to 9.2 years with the mean age of 8.0.

Each subject's level of cognitive development was determined by performance on six Piagetian conservation tasks: number, substance, liquid, area, weight and volume. Two groups were established: preoperational/transitional group, those who scored below the mean score of 4.1 on the conservation tasks; and the concrete operational group, those who either completed all six tasks successfully or who failed only the most advanced conservation of volume task.

Testing Instruments and Procedures

The subjects from both groups were evaluated on four tasks, and cognitive clarity scores were obtained. These tasks will be discussed separately.

The Additive Classification Task. The child's ability to freely sort concrete objects into two sub-groups based on the physical attributes of color, shape, size and depth was evaluated. Circles and squares in two colors, sizes, and thicknesses were selected from the Logical Blocks Kit produced by the Webster Division of the McGraw Hill Book Company, New York. The child was instructed to put the objects into two cardboard boxes so that the objects in each box belonged together and to then verbally justify the sorting. The procedure was repeated until either a sorting was completed for each attribute or the child was unable to produce a logical grouping.

The First Free Sorting Task. A free sorting mixed verbal and non-verbal task was designed by the researcher to determine whether the subject was able to make classes and sub-classes of cards with single written characters:

Capital letters - R, A, M, and Q

Lower case letters - e, n, g, and k

Numbers - 7, 4, 3, and 8

Non-letter non-number figures - , , , and .

The child was instructed to place the cards into two boxes so that all the cards belonged together in each box and to verbally justify his sorting. Depending on the initial sorting the child was asked to make sub-groups from one of both of the original groups. The procedure was continued until the child either isolated the four sub-classes of characters or was unable to produce any logical grouping.

The Second Free Sorting Task. A free sorting mixed verbal and non-verbal task was designed by the researcher to determine whether the subject was able to make classes and sub-classes of cards with the following written items:

Nonsense words - nar, fonor, kife, and dample

Meaningful words - school, candy, boy, and grasshopper

Phrases - to play, in the house, a big apple, and looking at the little dog

Sentences - Mother helps me., You will have fun at the park., I can't go fishing., and The bus is stopping here.

The nonsense words were selected from Wisconsin Design Skills Tests, Level B. The meaningful words were selected from a first grade basal word list to insure that all the children had been exposed to the vocabulary. The length of the words, phrases, and sentences were intentionally varied to help determine whether the child based the sorting upon the number of letters or words, the spaces between words, punctuation cues or meaning. The researcher read all the cards to the subject initially and then followed the first free sorting task procedure.

The Semi-structured interview. The purpose of the interview was to stimulate a dialogue in which cognitive clarity or confusion would be revealed. The core of structured questions include:

1. Can you read now?
2. a. What do you do when you read?
   b. Why do you think you can't read?
3. a. How did you first learn to read?
   b. What do you think people do when they read?
4. What do you think a letter of the alphabet is?
5. What do you think a word is?
6. What do you think a sentence is?

During the private, tape recorded session, the interviewer asked additional questions to encourage the child to give further information without influencing the child's response.

Computation of the Cognitive Clarity Scores

A cognitive clarity measure was designed to evaluate the free sorting tasks and the interview responses. Six categories of responses indicated cognitive confusion:

1. No response
2. Unclear or vague response
3. Value judgment response
4. Naming of significants (members of the classification) rather than signifiers (attributes of the classification)
5. Naming of a physical activity
6. Misuse of the terms: number, letter, sound, word, or sentence.

No points were awarded for these responses.

The presence of cognitive clarity was indicated by 15 categories of responses:

1-5. Initiates the correct use of these terms - number, letter, sound, word, or sentence.

6-9. Mentions a structural or functional attribute of these classifications - number, letter, word, or sentence.

10. Considers or mentions the function of spaces between words.

11. Considers or mentions punctuation cues.

12. Suggests that the purpose of language is to give meaning or to communicate.

13. Suggests that words and sentences are used in oral language as well as in written language.

14. Describes the decoding process.

15. Describes the encoding process.

One point was scored for each cognitive clarity category the subject either applied in the sorting tasks or mentioned verbally. Cognitive clarity scores were computed for the two free sorting tasks and for the interview session. A combined cognitive clarity score indicated the number of categories mentioned during the sorting tasks and the interview.

Analysis of Data

A two dimensional repeated measures design with a Pearson product moment correlation was used to test the hypotheses.

Findings from the Analysis of Variance

A two dimensional repeated measures design tested the relationship between attainment of the concrete operations and cognitive clarity in reading. Treatment A consisted of five levels: raw scores from the additive classification task, from the free sorting task, and from the second free sorting task; and the cognitive clarity scores obtained from the free sorting sessions and the interview. Treatment B consisted of two levels: assignment to the preoperational/transitional group and assignment to the concrete operational group.

The analysis of variance tested the following null hypotheses:

1. There is no significant interaction between the two groups and repeated measurements on the groups.
2. There is no significant difference between the group means.
3. There is no significant difference between the task means.

The first null hypothesis dealing with the interaction effect and the second null hypothesis dealing with the group main effect were both tested at the .05 level of significance. The data failed to

reject both null hypotheses. It can be interpreted that the two groups functioned independently of one another on the five tasks and that although the means for the concrete operational group on the five tasks were higher than those for the preoperational/transitional group, the differences were not significant.

The third null hypothesis dealing with the task main effect was rejected. The subjects performed differently on the various tasks to a significant degree. The developmental progressions from concrete objects to symbols and from motor actions to speech were reflected in these results.

Findings from the Correlation Study

A correlation matrix was required to test the remaining nine null hypotheses.

There is no significant relationship between:

1. performance on the conservation tasks and sex,
2. performance on the conservation tasks and age,
3. performance on the conservation tasks and each free sorting task,
4. performance on the conservation tasks and each of the cognitive clarity scores,
5. performance on the conservation tasks and the total reading scale or its subscales,
6. performance on the additive classification task with concrete objects and performance on the conservation tasks or either free sorting task,
7. the cognitive clarity score from the free sorting tasks and the total reading scale or its subscales,
8. the cognitive clarity score from the interview session and the total reading scale or its subscales,
9. the combined cognitive clarity score and the total reading scale or its subscales.

Correlation coefficients were calculated between fourteen variables among which were sex, age, scores for the tasks completed in this study, and scores from the Metropolitan Reading Achievement Test, Primary I, Form F. No reading scores were available for one subject so none of his scores were used. With $n = 19$ and $df = 17$, the critical values used were $r = 0.4555$, $p < .05$, and $r = 0.5751$, $p < .01$.

The following conclusions were drawn from the data:

1. There was a relationship between performance on the conservation tasks and sex. The boys performed better than the girls.

2. There was a positive relationship between performance on the conservation tasks and two free sorting tasks.

3. There was a positive relationship between performance on the conservation tasks and the free sorting cognitive clarity scores.

4. No relationships were found between the performance on the conservation tasks and: age, the interview cognitive clarity score, the combined cognitive clarity score, or the reading scale and subscales.

5. No relationships were found between the performance on the additive classification tasks and: performances on the conservation tasks or the two free sorting tasks.

6. There were positive relationships between the free sorting cognitive clarity score and: the total reading scale, the word knowledge subscale, and the reading subscale; but there was no relationship between the free sorting cognitive clarity score and the word analysis subscale.

7. There was a positive relationship between the interview cognitive clarity score and word analysis subscale only.

8. There were positive relationships between the combined cognitive clarity score and the total reading scale and each of the subscales.

Conclusions and Implications

The conclusions drawn from the research data dealt with the child's concept of reading, the relationship between the attainment of the concrete operations and reading, and the relationship between cognitive clarity in reading and reading achievement.

The Child's Concept of Reading

The data from the two free sorting tasks and the interviews generally supported the findings of previous studies.

1. Both non-verbal and verbal responses indicated a wide spread in ability ranging from cognitive confusion to cognitive clarity in reading.

2. Each child's concept of reading was based on his experience and was unique.

3. Approximately 65 percent of the children described the reading process in mechanical, superficial terms rather than personal, significant terms.

4. Approximately 65 percent of the children did not accept the responsibility for learning how to read, but expected their teachers or parents to teach them.

5. Approximately 33 percent of the children did not mention that reading, sentences, or words had to do with meaning.

6. From the ten children who were asked what they do when they come to an unfamiliar word, eight children referred to the decoding process (sounding out words) but none of the children mentioned semantic or syntactic cues.

7. A sequence of development in the ability to form linguistic classes was indicated. Number was recognized more often as a class than letter. Although thirteen children could make a group of letters, only nine of these children sorted the letters into upper case and lower case letters. Word was recognized as a class more often than sentence.

8. Considerable confusion resulted from the children's mistaken notion that the number of letters defines word and that the number of words defines sentence.

9. Only slightly more than 50 percent of the children applied the printer's space during the free sorting task and only two children mentioned spaces between words while defining words and sentences.

10. Punctuation cues were applied by 50 percent of the children and mentioned by 30 percent of the children.

11. Two children had difficulty analyzing language by its structure because they were concerned with meaning. They tried to match the cards in one-to-one relationships, such as Mother helps me. with in the house.

Concrete Operations and Reading

The data on the relationship between the attainment of the concrete operations and the child's concept of reading were inconclusive. The existence of significant relationships was influenced by the instruments used to measure cognitive clarity. The free sorting tasks and the derived cognitive clarity score apparently emphasized different aspects of cognitive clarity than the interview and the derived cognitive clarity score. There were significant relationships between the attainment of the concrete operations and: the ability to form classes of numbers, letters, and non-letter non-number characters; the ability to form classes of nonsense words, words, phrases and sentences; and the cognitive clarity score derived from the free sorting task in which linguistic class concepts were emphasized.

Cognitive Clarity and Reading Achievement

There were significant relationships among the three cognitive clarity measures and the reading scale and subscales. However, since significant correlations were not found between all the variables, questions remain concerning the nature of the relationship between cognitive clarity of reading and reading achievement. The significant correlations in this study reflected two facts. First, the total reading scale consisted of the word knowledge and the reading subscales combined but did not include the word analysis subscale. Second, the combined cognitive clarity score was based on the free sorting tasks as well as the interview session.

Implications for Research

To validate the findings and to generalize the conclusions, the same instruments and procedures should be used with different and larger populations of randomly selected subjects who represent a wider range in age and cognitive ability. Refinements in the sorting tasks and interview core questions could be made so that specific areas of cognitive clarity might be identified and measured in greater detail in subsequent studies. The study could be replicated using other reading achievement instruments. A longitudinal study in which all test instruments were administered within a short period of time and readministered perhaps every six months might help to further identify stages of development and the complex relationships among cognition, cognitive clarity, and reading achievement.

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